REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 69-96 are now present in this application, of which claims 69, 81, 89, and 94 are independent. By this amendment, claims 39-68 have been canceled, without prejudice or disclaimer, and claims 69-96 have been added. Reconsideration of this application, as amended, is respectfully requested.

Request for Withdrawal of Finality of Office Action

Applicants respectfully submit that the present amendment is being filed concurrently with an RCE. Accordingly, withdrawal of the finality of the previous Office Action, and an Office Action on the merits with respect to claims 69-96 are respectfully requested.

Rejections under 35 U.S.C. §103

Claims 39-68 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over DE '508. This rejection is respectfully traversed.

A complete discussion of the Examiner's rejection is set forth in the Office Action, and is not being repeated here.

While not conceding the appropriateness of the Examiner's rejection, but merely to advance prosecution of the instant application, Applicants respectfully submit that claims 39-68 have been cancelled, thus rendering this rejection under 35 U.S.C. § 103 moot. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

For the Examiner's convenience, Applicants attach hereto an English language translation of DE 197 43 508 A1.

Claims 69-96

Claims 69-96 have been added for the Examiner's consideration.

Independent claim 69 recites a combination of steps for a washing method in a washing machine having a cabinet, a wash tub located in the cabinet, a wash drum located in the wash tub, a valve connected to a water source, a water supply line connected to the valve, and a steam

generator located in the cabinet between an outer circumferential side of the wash tub and the cabinet, the steam generator being connected to the water supply line, the method including "supplying water to the wash tub through the steam generator," "tumbling laundry in the wash drum by rotating the wash drum when water is in the wash tub," "storing water in a space between the valve and the wash tub," "generating steam from the stored water by the steam generator after supplying water to the wash tub through the steam generator," and "supplying the generated steam into the wash tub while tumbling the laundry, the generated steam being supplied through a steam supply line that is independent of the water supply line, the steam supply line being in communication with the wash tub at an upper portion of the wash tub."

Applicants respectfully submit that this combination of steps as set forth in independent claim 69 is not disclosed or made obvious by the prior art of record. In particular, DE '508 fails to teach or suggest at least storing water in a space between the valve and the washtub and generating steam from the stored water.

Applicants respectfully submit that the combination of elements as set forth in independent claim 69 is not disclosed or made obvious by the prior art of record for the reasons explained above.

With regard to dependent claims 70-80, Applicants submit that claims 70-80 depend, either directly or indirectly, from independent claim 69, which is allowable for the reasons set forth above, and therefore claims 70-80 are allowable based on their dependence from claim 69.

Independent claim 81 recites a combination of steps for a washing method in a washing machine having a cabinet, a wash tub located in the cabinet, a wash drum located in the wash tub, a water supply line, and a steam generator located in the cabinet between an outer circumferential side of the wash tub and the cabinet, the steam generator being connected to the water supply line, and a detergent box, the method including "supplying water to the wash tub through the detergent box," "tumbling laundry by rotating the wash drum when water is in the wash tub," "after starting tumbling of the laundry, supplying water into the steam generator through the water supply line, the water in the steam generator being separate from the water in the wash tub," "generating steam by the steam generator from the water supplied into the steam generator," and "supplying the generated steam into the wash tub while tumbling the laundry, the generated steam being supplied through a steam supply line that is independent of the water

supply line, the steam supply being in communication with the wash tub at an upper portion of the wash tub."

Applicants respectfully submit that this combination of steps as set forth in independent claim 81 is not disclosed or made obvious by the prior art of record. In particular, DE '508 fails to teach or suggest supplying water into the steam generator through the water supply line after starting tumbling of the laundry. Rather, DE '508 specifically teaches introducing steam prior to tumbling the laundry in the washing machine.

Applicants respectfully submit that the combination of elements as set forth in independent claim 81 is not disclosed or made obvious by the prior art of record for the reasons explained above.

With regard to dependent claims 82-88, Applicants submit that claims 82-88 depend, either directly or indirectly, from independent claim 81, which is allowable for the reasons set forth above, and therefore claims 82-88 are allowable based on their dependence from claim 81.

Independent claim 89 recites a combination of steps for a washing method in a washing machine having a cabinet, a wash tub located in the cabinet, a wash drum located in the wash tub, a water supply line, and a steam generator located in the cabinet between an outer circumferential side of the wash tub and the cabinet, the steam generator being connected to the water supply line. The method includes "supplying water to the wash tub," "tumbling laundry in the wash drum by rotating the wash drum when water is in the wash tub," "supplying water to the steam generator located in the cabinet through the water supply line," "generating steam by the steam generator after supplying water to the wash tub, the steam generator being isolated from the wash tub such that air in the wash tub is not introduced into the steam generator while generating steam," and "supplying the generated steam into the wash tub while tumbling the laundry, the generated steam being supplied through a steam supply line that is independent of the water supply line, the steam supply line being in communication with the wash tub at an upper portion of the wash tub."

Applicants respectfully submit that this combination of steps as set forth in independent claim 89 is not disclosed or made obvious by the prior art of record. In particular, DE '508 fails to teach or suggest generating steam by the steam generator after supplying water to the wash tub, and the steam generator being isolated from the wash tub such that air in the wash tub is not

introduced into the steam generator while generating steam. Rather, DE '508 specifically teaches that the heating element 9 is formed in the drying *air* duct 13, which is clearly in communication with the air in tub 1.

Applicants respectfully submit that the combination of steps as set forth in independent claim 89 is not disclosed or made obvious by the prior art of record for the reasons explained above. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

With regard to dependent claims 90-93, Applicants submit that claims 90-93 depend, either directly or indirectly, from independent claim 89, which is allowable for the reasons set forth above, and therefore claims 90-93 are allowable based on their dependence from claim 89. Reconsideration and allowance thereof are respectfully requested.

Independent claim 94 recites a combination of steps for a washing method in a washing machine having a cabinet, a wash tub located in the cabinet, a wash drum located in the wash tub, a valve connected to water source, a water supply line connected to the valve, and a steam generator located in the cabinet between an outer circumferential side of the wash tub and the cabinet, the steam generator being connected to the water supply line, the method including "opening the valve to supply water to the wash tub through the steam generator," "tumbling laundry in the wash drum by rotating the wash drum when water is in the wash tub," "generating steam from the water remained between the valve and the wash tub after supplying water to the wash tub through the steam generator," and "supplying the generated steam into the wash tub, the generated steam being supplied through a steam supply line that is independent of the water supply line, the steam supply line being in communication with the wash tub at an upper portion of the wash tub."

Applicants respectfully submit that this combination of steps as set forth in independent claim 94 is not disclosed or made obvious by the prior art of record. In particular, DE '508 fails to teach or suggest generating steam from the water remained between the valve and the wash tub after supplying water to the wash tub through the steam generator.

Applicants respectfully submit that the combination of elements as set forth in independent claim 94 is not disclosed or made obvious by the prior art of record for the reasons explained above.

With regard to dependent claims 95 and 96, Applicants submit that claims 95 and 96 depend, either directly or indirectly, from independent claim 94, which is allowable for the reasons set forth above, and therefore claims 95 and 96 are allowable based on their dependence from claim 94.

Consideration and allowance of claims 69-96 are respectfully requested.

CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Chad D. Wells, Registration No. 50,875, at (703) 205-8000, in the Washington, D.C. area.

Prompt and favorable consideration of this Amendment is respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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Attachment: English Translation of DE 197 43 508 A1

METHOD FOR HEATING THE WASH WATER IN A WASHING MACHINE

DESCRIPTION

The present invention relates to a method for heating the wash water in a washing machine, in particular in a washer/dryer combination, according to the preamble of claim 1.

In washing machines, and in washing machines that include a clothes dryer (so-called washer/dryer combinations), soapy wash water is usually used for washing, particularly laundry. To increase the cleaning power, the wash water is usually heated.

In conventional washing machines, the heating of the wash water is either done via a heating element in the tub or via a recirculating pump system in a continuous-flow heater. These conventional solutions have various disadvantages.

In both scenarios, the wash water is brought in direct contact with the heating element, or at least with predominantly metallic surfaces supporting a heating element. This results in calcium deposits on the heating element and/or the metallic surfaces and corrosion thereof, thus decreasing their functional efficiency and their economic life span/durability. Since, as a rule, the wash water includes detergents, it has an especially corrosive effect on the heating element or the metallic surfaces, in particular at higher temperatures.

Since in both cases, the wash water has to be brought in contact with the heating element or the metallic surfaces, there is the further disadvantage of the so-called "tote Flotte", or dead flow, that is, a volume of wash water that does not take part in the washing process but only washes around the heating element for the purpose of heat transmission. In the instance of a recirculating pump system with a continuous-flow heater, the dead flow is the volume of wash water retained in the recirculating pump system and continuous-flow heater. If a heating element arranged in the tub is used, there is a dead flow because the tub has to be of a larger size thus requiring a larger volume of wash water, since in addition to the objects to be washed, it also has to accommodate the heating element. In devices for washing laundry, the laundry is usually loaded into a rotatable drum, which is arranged in the tub and is permeated by the wash water. In this way, a dead flow is generated between drum and tub, which

increases if in addition, the heating element is arranged between drum and tub. As a result of the dead flow, which is always present in the conventional methods for heating the wash water, the consumption of detergent, water and energy increases, thus prolonging the length of the washing cycle due to the larger volume of wash water to be heated.

It is therefore the object of the present invention to provide a method for heating the wash water, which reduces the dead flow, and/or danger of corrosion and calcium deposits on the heating element, and/or the length of the washing cycle.

The solution is found in the features of claim 1.

The method for heating the wash water in a washing machine, which is at least partially loaded with laundry, in particular a washer/dryer combination, with at least one heating element, according to the invention is characterized in that a non-aggressive heating medium passes by at least one heating element, is heated by it, and is subsequently brought in contact with the wash water. In this way, by eliminating the heating element in the dead flow, direct contact between corrosive wash water and heating device is avoided, and in addition, the dead flow is reduced. The result thereof is a longer operational life span of the heating element and a decrease in detergent, water and energy consumption for the washing machine, or the washer/dryer combination. When the laundry is soaked with wash water, the area available for the heat transfer between heating medium and wash water is increased, thus increasing the heating effect. If the heating element in the dead flow is not eliminated, the length of the washing cycle decreases considerably at greatly increased heat output.

Beneficially, the heating medium is an air/water mixture or an air/steam mixture. By using air as a heating medium, if necessary together with water or steam, the energy consumption for heating the heating medium is kept low due to the low density and thermal capacity of air, and minimum corrosion of the heating element is ensured. Furthermore, steam has the advantage of releasing a particularly high amount of energy in the form of heat during condensation.

Beneficially, the laundry is hereby agitated in the washing machine, at least from time to time. This ensures that the laundry is always soaked with wash water, thus achieving an especially good heat transfer between heating medium and wash water.

Additionally, it is avoided in this way that the inflowing hot heating medium locally overheats the laundry in the washing machine, thus causing damage to the laundry.

It is beneficial for the heating medium to be of a temperature of essentially more than 130° C and a relative air humidity of essentially more than 95° C. By using a high temperature, a quick heating of the wash water is achieved, thus avoiding, due to the high air humidity, a drying up of the objects in the washing machine that are soaked or wetted with wash water.

Beneficially, the at least one heating element is used for heating the heating medium as well as the air used for drying the laundry. In this particularly beneficial embodiment, the heating element already present in washer/dryer combinations for heating the drying air is also used for heating the wash water, thus eliminating the need for an additional separate heating element.

Beneficially, the heating medium is channeled via an inlet opening in a tub to the wash water contained therein, and is discharged via a discharge opening in the tub, whereby both openings are located above the highest wash water level. In this way, a penetration of the wash water into the ducts for guiding the heating medium is avoided. In a washer/dryer combination, the already present ducts for guiding the heating medium are also used for guiding the heating medium, thus eliminating the expenditure of an additional structural part.

Beneficially, the heating medium is blown through the wash water. Thus, an especially intimate contact between heating medium and wash water, and an especially good heat transfer is achieved.

Beneficially, the inlet opening and the discharge opening for the heating medium are arranged in the tub far apart from one another, so that the heating medium travels as long a distance as possible in the tub thus connecting with the wash water for a long time, and in this way, a good heat exchange between heating medium and wash water takes place.

Furthermore, the present invention relates to a washing machine, in particular a water/dryer combination, comprised of a container for accommodating the wash water and the laundry, and having at least one heating element, which heats the wash water in accordance with an embodiment of the method of the present invention. With such

washing machines, lower detergent, water and energy consumption as well as less corrosion of the heating element can be achieved. Additionally, in washer/dryer combinations, the need for an additional heating device for heating the wash water is eliminated so that a smaller manufacturing size is achievable and/or the dead flow volume can be kept low.

Beneficially, in the washing machine of the present invention, particularly in a washer/dryer combination, the water for washing, rinsing and cooling is channeled to the tub via the same channel and the same opening as the heating medium. In this way, the number of inlets connected directly to the drum can be reduced. Especially, if the detergent is not added via a detergent dispensing unit with a separate feeder line to the tub, but instead is added directly to the laundry via a separate receptacle, the number of feeder lines, and thus possible leaking or defective areas, can be reduced to a minimum.

It is beneficial for the heating element to also heat the introduced water for washing and rinsing. In this way, a separate heating device is not needed.

Further details, features and benefits of the present invention can be found in the description therebelow of a preferred embodiment with reference to the drawing.

In the drawing, the sole figure illustrates the schematic construction of a washer/dryer combination for laundry for the implementation of an embodiment of the method of the present invention.

As shown in the figure, the laundry 5 to be washed and dried is located in a drum 3, which in turn is located in a tub 1. The tub 1 is at least partially filled with wash water 7, which contains cleansing substances. Down below on the tub 1, a drain line 21 is connected, in which a pump 19 for extracting the wash water 7 and the rinsing water at the end of the washing process. On the top, for adding the detergent, the tub 1 is provided with a dispensing unit 23 from which the detergent is washed into the tub 1, together with clean water from the water intake 25. In addition, a drying air duct 13 is connected to the tub 1. Both ends of the drying air duct 13 terminate in the tub 1 above the highest level of wash water 7. The drying air duct 13 is provided with a blowing fan 11, which circulates the air in the drying air duct through the tub 1 and the drum 3 loaded with laundry 5. This drying air duct 13 is provided with a heating element 9 for

heating the drying air, a water intake 15 in flow direction behind the blowing fan, and a water intake 17 in front of the blowing fan.

At the launch of the washing process, the detergent in the dispenser unit 23 is washed via the water intake 25 into the tub 1, and additional washing water is supplied by the water intake 15 and/or 17 via the drying air duct 13. The washing water introduced via drying air duct 13 can thereby already be heated by the heating element 9. After reaching the target volume of wash water 7 in the tub 1, the drum 3 containing the laundry 5 to be washed is set in rotational motion, whereupon the laundry 5 is being soaked with wash water 7. To heat the wash water 7, hot air is blown in by blowing fan 11 via the drying air duct 13 to be heated by heating element 9. In drum 3, the hot air washes around the laundry 5 in the wash water 7, thus heating both wash water and laundry. To keep the soaked laundry 5 from being dried out by the hot air, the air has an increased humidity. For this purpose, the circulating air can be further humidified by one of water intakes 15 or 17.

Once the washing process is completed, the wash water is extracted by pump 19 via the drain line 21, and the remaining wash water 7 in the laundry 5 is removed by rinsing with clean water. The water for rinsing can be supplied by one of water intake lines 15 or 17, and can be heated by heating element 9, if so desired. At the end of the washing and rinsing process, the rinsing water remaining in the laundry is commonly removed for the most part by spinning the drum 3.

Subsequently, the laundry 5 is dried by drying air, which is circulated in the duct 13 by blowing fan 11 and is heated by heating element 9.

Thus, the solution of the present invention provides a method for heating the wash water in a washing machine, in particular a washer/dryer combination, wherein the corrosive and calciferous wash water does not come in direct contact with the heating element, and the dead flow of the wash water can be reduced to a minimum. As a result, the durability and the efficiency of the heating element is increased, and the consumption of water, detergent and energy is decreased.

In addition, if this method is used in a washer/dryer combination, a separate heating element for heating the wash water in addition to the heating element required for heating the drying air is not needed. This results in a savings on structural parts,

which entails a reduction in structural size and an increase in operational reliability due to a reduction in the number of structural parts. By additionally mounting a heating element 27 in the space for the dead flow, however, the length of the washing cycle can be considerably reduced because the heat output is almost doubled.

The application of the method of the present invention in household appliances can be particularly beneficial because they require especially reliable operation without frequent maintenance service as a result of corrosion or calcium deposits.

The invention is not limited to the described exemplary embodiment.

Alternatively, the method of the present invention can generally be applied in washing machines or dish washers, in which wash water is heated, as in a dish washer, for example. Particularly, its application is especially beneficial in washing machines, in which a washing as well as a drying process takes place.

PATENT CLAIMS

1. A method for heating the wash water in a washing machine that is at least partially loaded with laundry, in particular in a washer/dryer combination, having at least one heating element, **characterized in that** a heating medium passes by the at least one heating element (9), is heated by it, and is subsequently brought into contact with the wash water (7).

2. The method according to claim 1, characterized in that the heading medium is air, an air/water mixture, or an air/steam mixture.

3. The method according to claim 1 or 2, characterized in that the laundry (5) in the washing machine at least occasionally agitated.

4. The method according to one of claims 1 or 3, characterized in that the heating medium has a temperature of essentially more than 130° C and a relative air humidity of essentially more than 95 %.

5. The method according to one of claims 1 to 4, characterized in that the at least one heating element (9) is used both for heating the heating medium as well as the air used for drying the laundry (5).

6. The method according to one of claims 1 to 5, characterized in that the heating medium is channeled via a feeder opening in a tub (1) to the wash water (7) contained therein, and is discharged via a discharge opening in the tub (1), wherein both openings are located above the maximum wash water level.

7. The method according to one of claims 1 to 5, characterized in that the heating medium is blown through the wash water (7).

8. The method according to claim 6 or 7, characterized in that the feeder opening and the discharge opening in the tub (1) are arranged at the furthest possible distance from one another.

9. A washing machine, in particular a washer/dryer combination, comprised of a tub for accommodating the wash water and the laundry, and at least one heating element, characterized in that the wash water (7) is heated in accordance with a method according to one of claims 1 to 8.

10. The washing machine, in particular a washer/dryer combination, according to claim 9, characterized in that washing water, rinsing water and cooling water are supplied to the tub (1) via the same channel and the same opening as the heating medium.

11. The washing machine, in particular a washer/dryer combination, according to claim 11, characterized in that the heating element (9) also heats the supplied washing and rinsing water.

12. The washing machine according to one of the previous claims, characterized in that in addition, a heating device (27) is provided in the space for the dead flow.

ABSTRACT OF THE DISCLOSURE

In the method for heating the wash water (7) in a washing machine that is at least partially loaded with laundry (5), in particular a washer/dryer combination with at least one heating element (9), a heating medium passes the heating element, is heated by it, and is subsequently brought in contact with the wash water. In this way, corrosion and calcification of the heating element (9) can be reduced, the volume of needed wash water (7) be decreased, and thus the water, detergent and energy consumption can be lowered. In the beneficial application of the method in a washer/dryer combination, air is used for a heating medium, and the heating element heats the wash water as well as the air used to dry the washed laundry. Therefore, if used in washer/dryer combinations, the expense of an additional heating element can be eliminated.

REFERENCE NUMERALS

1	Laugenbehälter - tub
2	-
3	Trommel - drum
4	-
5	Wäsche - laundry
6	-
7	Waschlauge - wash water
8	-
9	Heizelement - heating element
10	-
11	Gebläse – blowing fan
12	-
13	Trocknungsluftkanal – drying air duct
14	-
15	Wasserzuführung – water intake
16	-
17	Wasserzuführung - water intake
18	-
19	Pumpe - pump
20	-
21	Ablaufleitung – drain line
22	-
23	Einspülschale – detergent dispensing unit
24	-
25	Wasserzuführung - water intake
26	-
27	Heizeinrichtung – heating element/heating device